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### Perceived health status after kidney transplantation

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# Discussion, clinical implications and possibilities for future research

## 7.1. General discussion

Perceived health status, together with mortality, morbidity and cost utilization, is an important outcome measure necessary for evaluating the quality of medical care <sup>1,2</sup>. The main aim of this thesis was to explore predictors of perceived health status in kidney transplant recipients. The theoretical framework of this thesis included a model of the disablement process based on the Disease-Handicap Model by Verbrugge and Jette <sup>3</sup> as well as the International Classification of Functioning, Disability and Health <sup>4</sup>. The proposed model contained several medical and non-medical variables which may have an influence on perceived health status in patients after kidney transplantation. In this final chapter we discuss whether the model fits. In addition to theoretical consequences, the clinical importance and implications for practice are addressed here, as well as possibilities for future research.

### 7.1.1. Research question 1

The second chapter of the thesis discussed the following research question.

*1 Are the differences in perceived health status between transplant and dialysis populations based on modality of therapy or on selection bias?*

When considering recipients of a cadaveric kidney, one should be aware that two processes of selection happen before a patient is transplanted. Any comparison of health status of transplant recipients to patients on dialysis is therefore doubly biased, involving in comparison of young and relatively healthy transplant recipients to older and more ill dialysed patients <sup>5</sup>. Focusing on these facts, our study was designed as the comparison of perceived health status between dialysed patients on a waiting list for cadaveric transplantation and incident kidney transplant recipients 3 months after kidney transplantation, matched for age, gender and co-morbidity.

The present study confirmed that patients after kidney transplantation feel better than those on dialysis <sup>6</sup>. The physical component of perceived

health status is reduced in dialysis patients in particular. However, a significant selection bias is present as only some dialysed patients are put onto a waiting list and only some of them are actually transplanted. When patients after kidney transplantation were compared to their matched pairs on a waiting list, no differences in perceived health status were found.

### **7.1.2 Research question 2a**

Chapters 3 and 4 provided answers to the following research question.

*2a Which medical variables (kidney function, adverse effects of immuno-suppressive treatment, co-morbid diseases, duration of kidney disease, number of hospitalizations, period after transplantation) influence perceived health status?*

Age is the most important predictor of perceived health status in patients after kidney transplantation, as it explains 23.3% of variance in physical and 4.4% in mental perceived health status. With increasing age perceived health status worsens<sup>7</sup>. When patients are not stratified by age, the analysis of other predictors of perceived health status has very limited results. Additional analyses are therefore performed with the sample stratified by age.

Perceived health status in young patients is mostly influenced by their renal function and side-effects of immunosuppression. Fujisawa et al. published a study based on 117 kidney transplant recipients with ages similar to the patients younger than 40 years in our research, and found lower serum creatinine to be a significant predictor of better results in SF-36 subscales<sup>8</sup>. It seems that for young people success of transplantation is one of the most important determinants of their perceived health status. With good kidney function their reintegration into society is successful, and they report excellent perceived health status. The major concern in this age category lies therefore in optimizing the kidney function, but with careful balance in the treatment to minimize side-effects. On the other hand, kidney function is not a predictor of perceived health status in older patients ( $\geq 40$  years old). Adverse effects of immunosuppressive medication are the most important medical variable in this age category. A possible explanation is that while the main worries of younger patients are connected with the long-term fate of their graft<sup>9</sup>, older patients accept even lower kidney function as long as they feel the same benefit in terms of relieving their dependency on dialysis. Major variations in perceived health status are detected among elderly kidney transplant recipients, and no predictor is predominant. Despite the lower percentage of explained variance, perceived health status has quite clear medical determinants: co-morbidity (presence of diabetes mellitus, the number of pre-transplant and post-transplant hospitalizations). These results are similar to those in the study by Siegal et al.<sup>10</sup>.

When considering perceived health status in elderly kidney transplant recipients, they appear to benefit even with 'less successful transplantation' with worse kidney function and higher serum creatinine. Instead of graft function, serious co-morbid conditions that require medical attention (represented by the number of hospitalizations) are more important for this age group <sup>9</sup>, so the major implications for practice are connected with optimizing treatment and following up co-morbid diseases. Diabetes mellitus and cardiovascular morbidity are particularly important, as their prevalence among elderly transplant recipients is high <sup>11</sup>.

The most important medical variable for all age groups is the presence of unpleasant side-effects of immunosuppressive treatment. From the patient's perspective the most stressful non-infectious non-oncological adverse effects of immunosuppression are pain, weakness, cosmetic changes and psychological symptoms (depression and anxiety). Other researchers found adverse symptoms to be connected to lower quality of life as well <sup>12</sup>. The stress from adverse effects is higher in women and less-educated patients. The type of immunosuppressive regimen does not seem to influence the overall score of stress, but the use of new drugs exhibits less stress in some symptoms.

### **7.1.3 Research question 2b**

Chapter 5 switches the attention to personal factors which may play a role in perceived health status, and deals with the following research question.

*2b What is the relation of adverse effects of treatment and noncompliance with the therapy to perceived health status? Is noncompliance related to adverse effects of treatment?*

Our findings show that subclinical noncompliance is a quite common situation, appearing in more than half of the patients. The consequence of the findings presented in Chapter 5 for clinical practice is that the adverse symptoms should be constantly evaluated by the transplant team, and major efforts should aim at decreasing their severity <sup>13-16</sup>, because they are strong predictors of noncompliance with the therapy (12.3-times higher risk). Other risk factors leading to noncompliance identified in our sample by the logistic regression analysis were male gender (7.5-times higher risk), worse perceived health status (4.5-times higher risk) and fair satisfaction with social support (4.5-times higher risk). The detection of this feature is of important clinical interest and the investigation techniques require constant updates <sup>17</sup>, because noncompliance is associated with higher frequency of late graft dysfunction, which is directly related to graft loss <sup>13,18-20</sup>. It seems reasonable to increase the rate of detection of noncompliers by adding the physician's opinion to the patient's self-referral. From our

results we can conclude that the relationship between perceived health status and compliance is bi-directional, and adverse effects are very important predictors for both perceived health status and compliance as well.

#### **7.1.4. Research question 2c**

The main objective of the sixth chapter is to merge the impact of environmental and personal factors on perceived health status after kidney transplantation.

*2c Are there non-medical confounders (age, gender, socio-economical status, social support) that are related to perceived health status in addition to medical variables?*

Apart from medical predictors, a wide range of other variables may influence perceived health status. The impact of age has already been discussed above. Of the other non-medical variables, social support has a predominant effect on health status in younger patients, while the ability to participate in everyday activities and higher education are important for older patients.

Socio-economic status is frequently reported to be related to perceived health status <sup>7,9,10,21</sup>. Surprisingly, in our study lower education is a negative predictor of health status only in patients 40-59 years old. One possible explanation is that the sample contained only 10 university-educated persons, all middle-aged. We tried to explore the relationship between employment status and perceived health status, but our sample contained nearly 90% disabled, retired or unemployed patients, whereas many other studies have reported improvement of employment capabilities after transplantation <sup>22</sup>. On the other hand, we realized that transplanted patients usually work at home more than other people, so we questioned them about their time spent on house-keeping. We found that middle-aged patients with more house-keeping activities declared better perceived health status.

It seems that sufficient social support is another prerequisite for good perceived health status. Our results in the group of patients younger than 40 years are similar to those in the study by Hathaway et al. with 91 patients with mean age 39.2 years, who found social support to be the most important predictor of all measures in the Sickness Impact Profile questionnaire <sup>7</sup>. Other studies have proved the importance of social support as well <sup>10,21</sup>.

Transplant nephrologists usually focus in their everyday practice on medical factors alone and the non-medical factors are not taken into account by the transplant teams. Our results provide the evidence that individual patients can evaluate their health rather differently even when

their medical variables are very similar or even identical <sup>1</sup>.

### **7.1.5 Conclusions**

We may conclude that not only medical factors (kidney function, side effects of immunosuppression, noncompliance with the treatment, comorbidity) but also social-demographic factors (age, education, social support) significantly influence the perceived health status after kidney transplantation. The explained variance is satisfactory. These findings are not only useful for enlarging the understanding of the disability and rehabilitation process of transplanted patients, but they also have direct consequences for clinical practice.

## **7.2. The disablement process in patients with end-stage renal disease**

End-stage renal disease imposes a heavy burden on an individual's life due to several impairments and activity limitations. Diminished perceived health status is reported as a result of this disablement process. Our data from Chapter 2 indicate that the physical component of perceived health status is affected in particular.

The theoretical model of the disablement process in patients with end-stage renal disease proposed in Chapter 1 (Figure 1.2) was presented and explored in previous chapters of this thesis. The results of our research indicate that relations between disease factors, personal factors, environmental factors and perceived health status may in practice resemble those in the proposed model. Apart from the direct line leading from kidney disease (kidney function) <sup>8</sup> and other co-morbid diseases <sup>9,10</sup> to activity restrictions and perceived health status, we identified several environmental and personal factors with significant impact on perceived health status.

Of the environmental factors, social support seems to be the non-medical predictor of perceived health status with the strongest impact <sup>7</sup>. Research into immunosuppression is quite broad and new drugs are successfully used, resulting in decreased rate of rejection episodes and improved short-term graft survival. We expected that the type of treatment might be an important environmental factor. Surprisingly, we did not confirm this relationship. Instead, adverse effects of treatment and kidney function (creatinine) are predictors of perceived health status. We may therefore expect the relationships between these medical variables to be more complex.

The most important personal factors are age <sup>7,9,23</sup> and adverse effects of immunosuppressive treatment <sup>10</sup>. In addition, we found relationships between some of these factors, namely adverse effects of treatment, compliance with treatment and perceived health status <sup>13,15,16</sup>.

Unfortunately, the design of this study does not allow us to address the causal pathway, so it is not possible to show whether noncompliance with immunosuppressive treatment is the cause or the effect of deteriorated perceived health status.

It seems that the proposed model may be generalized to any chronic disease. Disease-specific factors are unique to each chronic pathology, injury or disease, so their impact must be evaluated specifically to that disease; kidney function is such a factor in kidney transplant recipients. Other co-morbid diseases are important as well. Our experience indicates that restrictions resulting from co-morbidity (namely need for hospitalization) are more important for perceived health status than the type of co-morbidity itself. In addition, environmental and personal factors, as well as their interactions, are common to all chronic diseases<sup>24-27</sup>.

### **7.3. Clinical consequences and recommendations for clinical practice**

The results of our comparative study of perceived health status between dialysed patients on a waiting list for transplantation and their matches among incident kidney transplant recipients do not show significant differences between these two groups. The recommendations for clinical practice are aimed at the group of patients on dialysis waiting for transplantation. They expect successful transplantation to diminish their health complaints and improve their perceived health status. However, they often encounter new problems after transplantation, including adverse effects of immunosuppressive drugs, fear of rejection and infection or anxiety about long-term kidney function<sup>28</sup>. Intensive attention should therefore be paid not only to transplant recipients, but to patients on waiting lists as well. These potential candidates for transplantation need constant education and information aimed at improving their compliance even before transplantation.

The development and use of predicting schemes might help clinicians in uncovering noncompliance. The detection of patients with low adherence to the therapeutical regimen is a prerequisite for possible actions aimed at improving compliance and thereby reducing the threat of rejection and late graft loss<sup>13,17</sup>. Poor perceived health status is linked with worse compliance and therefore can be used as a cheap and easily measurable predictor of noncompliance in routine clinical practice. As adverse effects of immunosuppressive treatment are the main stressor for transplanted patients, their constant evaluation is crucial<sup>12,14</sup>. Another important strategy involves influencing non-medical predictors of noncompliance, mainly social support, so positive co-operation of medical staff with the patient's family members is also necessary.

Our data indicate that non-medical variables (age, education,

occupational status, social support) are as important predictors of perceived health status as the medical ones. This fact is often neglected by transplant physicians and nurses, who usually pay attention to medical factors only. Age predicts perceived health status independently from other factors <sup>7,9,23</sup>, so it is necessary to stratify patients by age when evaluating perceived health status. In all age groups both medical and non-medical variables play an important role, but their significance is age dependent as well.

The importance of the causal pathway from kidney pathology to restrictions in everyday life activities and perceived health status is well established. Disease-related factors therefore receive a lot of attention from medical staff, but environmental and personal factors playing an equally important role are usually not addressed. Unfortunately, the current social system in the Slovak Republic is not very supportive for active rehabilitation of kidney transplant recipients. Patients on dialysis and up to one year after transplantations are usually registered as disabled, but then their ability to work is evaluated solely on the value of serum creatinine. Other factors are not taken into account. After months or years of disability these patients are rarely able to reintegrate into the work process without any help. Although Slovakian legislation supports the employment of handicapped people, financial compensation for employing a handicapped person is not sufficient for the majority of employers. In addition, no dialysis or transplant centre in the Slovak Republic has a social worker among the staff members, so social disability and rehabilitation are simply left to the patients' own devices. In summary, the vicious circle of 'restrictions – disability – social and working deprivation' is closed and still awaits resolution. Creation of multidisciplinary transplant teams comprising a transplant nephrologist, a transplant nurse, a psychologist and a social worker maintaining intensive collaboration with patients' families is necessary, therefore, in order to assure better perceived health status as well as the patients' active rehabilitation and reintegration into society <sup>7</sup>.

## **7.4. Possibilities for future research**

The present research focuses on perceived health status of patients after kidney transplantation and dialysed patients on waiting lists. However, all the findings are based on a cross-sectional study design. Previous research provided some clues that time after transplantation may play an important role. Laupacis et al. evaluated 168 patients within a period of 19.5 months and found that perceived health status 6 months after transplantation improved compared to pre-transplantation, and stayed improved at the next follow-up <sup>29</sup>.



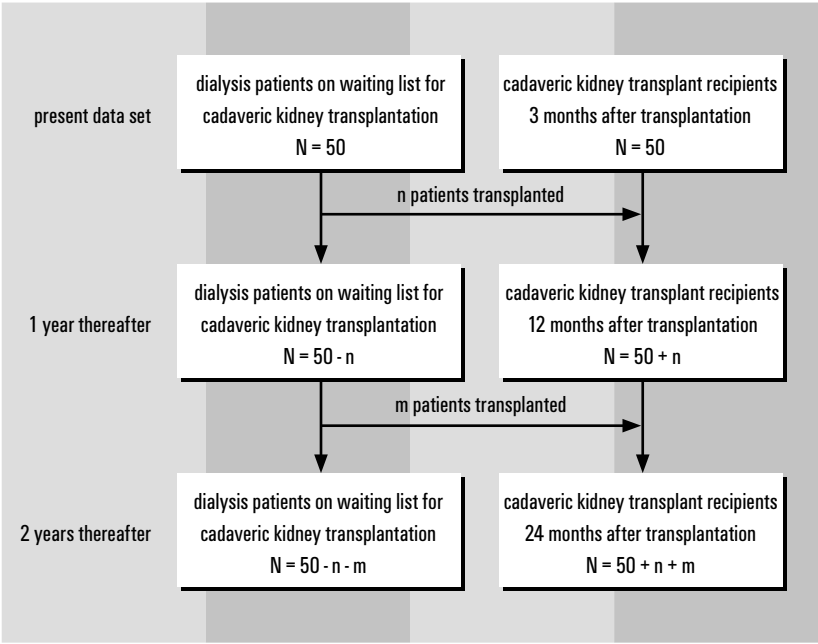
**7.4.1. Medical and psychological variables in future research**

It is important to continue our research and examine all participants (transplant recipients and dialysed patients as well) after one year and the next year thereafter. It is necessary to reckon with the fact that a small number of the dialysed patients on waiting lists will move into the transplant category, thus changing the numbers in both samples (Figure 7.1). Changes in perceived health status and its relationship to changes in medical determinants may form the topic of future research. Furthermore, a wide range of already-collected psychological data, combined with medical data, will enable us to clarify parts of the interaction between psychosocial and medical factors. The relationship of compliance to the treatment and personal characteristics, like mastery or type D personality profile, could be of particular interest.

**7.4.2. Longitudinal research on compliance**

Longitudinal research on compliance with immunosuppressive treatment is necessary as well <sup>30</sup>. It is possible to create a clinically-relevant

**Figure 7.1.** Design of future research



Dialysed patients on a waiting list for cadaveric kidney transplantation as well as patients already after transplantation will be assessed on an annual basis. Some fraction of dialysed patients will move into the transplant category.

prognostic model based on our cross-sectional data, which would help to predict noncompliers with the therapy. So long as the variables used in such a model are easily obtained and accessed by a transplant team, many rejections and subsequent graft losses could be prevented. The validity of this model must be evaluated in a longitudinal study. In addition, it is possible to design an intervention program for patients whose predicted compliance with the therapy is low. The intervention should aim at changing those factors with low scores within the model. The effectiveness of such a program should be evaluated.

Our data indicate that relationships between type of immunosuppression, adverse effects of treatment, compliance, kidney function and perceived health status are very complex and multidirectional. Longitudinal research on our transplant sample could explore the causal pathways.

#### **7.4.3. Multicenter study**

Finally, a multicenter analysis of the data we collected during the present research would greatly support our results, as similar information is available in Groningen from a cohort of Dutch patients. As the medical treatment is very similar in both countries, the differences in perceived health status, if they exist, would have to be the result of cross-cultural dissimilarities in non-medical factors between the cohorts.

In addition, differences in participation and reintegration into the working process between Slovak and Dutch kidney transplant recipients may be analysed, as both countries have a different social security system.

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